Control tactics of poplar diseases in China

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Abstract: Based on the present studies and literatures about the poplar diseases in China, the present study situation of poplar disease was introduced in this paper. 31 kinds of poplar diseases were collected of which there were 14 kinds of leaves disease, 11 kinds of branch disease, 4 kinds of root disease, 2 kinds of stand rot. Each poplar species was studied on the harm, distribution, symptom, pathogens, occurrence regulation and control measures. According to previously studies, the sustained control tactics of poplar disease were summarized in this paper.

Key words: Poplar diseases; Symptom; Present situation; Control tactics
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Introduction

With the rapidly developing of artificial poplar forests, poplar diseases increased gradually. Specially, poplar longhorned beetles and canker have become the main harmful factors of affecting the development of poplar stands. Therefore, the control tactics for poplar *Dothiorella* canker and *Cytospora* canker have been listed for key project in Seventh Five-Year Plan, Eighth Five-Year plan and Ninth Five-Year plan of China since the middle of 80s.

In Twentieth International Poplar Conference, "Integrated control technique of poplar disease in China" as a national report was presented (Xiang 1997; Xiang 1998; Jing 1977). Based on the disease resistance of host and reasonable cultivating technique, the integrated control technique was from the point of ecology and economy was a reasonable combination of chemistry control techniques with biological control techniques. This paper was invited and presented especially in 21st International Poplar Conference, and it was one part of important content of national report on poplar work in China.

Present situation of diseases on poplar

Leave diseases

1. Poplar black spot caused by *Marssonina bunnea* (Ell. ex Ev.) Magn., two specialized forms: one is *Marssonina brunneaf.* sp. *Monogarmtubi*, their host is Sect Aigeiros and Sect Tacamahaca; the other is *Marssonina brunneaf.* sp. *multigermtubi*, and their host is Sect Leuce.

Poplar black spot distributes in poplar cultivated area of northern China, and harms the seedlings and shoots of poplar.

2. Aspen black spot caused by *Septogloeum rhepaloideum* Dean. & Bigby., distributes in Xinjiang, and harms the seedlings of *Populus tremula*.

3. Poplar septorial blight caused by *Septoria populicola* Peck, and *S. populi* Desm., distributes in many districts of northwest, north and the middle of China.

4. Poplar turcicum caused by *Septotis populiperda* (Moesz. & Samarods) Waterman & Cash distributes in Shaanxi Province, and harms the seedlings of *Populus alba* var, *pyamidalis*, *Populus tomentose* and *Populus alba*.

5. Poplar leaf blight caused by *Alternaria alternata* (Fr.) Keiss, distributes in Heilongjiang Province and mainly harms the seedlings of *Populus xiaohei* and *Populus davidiana*.

6. *Poplar arthracnose* caused by *Colletorichum gloeosporioides* Penz. and *Glemerella cingulata* (Stonem). S. *et* S., distributes in northwest and north of China, and harms the young trees of *Populus tomentose* and *Populus beijingensis*.

7. Poplar leaf blotch caused by *Soptoria populi* Deam., *S. populicola* Peck and *S. tianschanica* Kravtz., distributes in northeast, northwest and the center section of China.

8. Poplar scab caused by *Venturia populina* (Vinll.) Fabr., *V. macularis* (Fr.) E. Muller and teleomorph of *Pollaccia radiosa* (Lib.) Bald. & Ccif., distributes in northeast and northwest and north of China .

9. White poplar leaf rust caused by *Melampsora magnusiana* Wanger, *M. rostupil* Wanger and *Uredo tholopsora* Cumm., distributes in north China and northwest of China, and harms the young seedlings

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and young trees of *Populus tomentose* and *Populus alba*.

10. Cathay poplar rust caused by *Melampsora laricipopulina* Kleb., distributes in every cultivated area of popular, and harms the young seedlings and young trees of many kinds of poplar species.

11. Euphrates poplar rust caused by *Melampsora pruinosae* Tranz., distributes in northwest regions, and harms the young seedlings and young trees of *Populus eaphratica* and *Populus pruinosa*.

12. Poplar powdery mildew caused by *Uncinula abunca* (Wallr.) Lev. var. *adunca et al.* including 7 species and 2 varieties, distributes in every cultivated area of poplar, and harms the young seedlings and young trees of many kinds of poplar.

13. Poplar crinkle caused by *Eriophyos dispar* Nal., distributes in regions of northwest and north of China,, and harms the young trees or old trees.

14. Poplar mosaic virus caused by PMV virus distributes in many regions of China, and harms the young seedlings and young trees of *Populus italica* or hybrids.

Trunk diseases

1. Poplar dorthiorella canker caused by *Botroyosphaeria ribis* (Tode) Gross. Et Dugg. and *Dothiorella gregaria* Sacc., distributes in poplar cultivated area of north china, harms the young trees of different poplar species and strains. It is one of the most serious poplar diseases and the most difficult controlled diseases.

2. Poplar cytospora canker caused by *Valsa sardida* Nit. and *Cytospora chrysosperma* (Pers.) Fr., distributes in poplar cultivated area of north china, and harms the young trees of different poplar species and strains. It is also one of the most serious poplar diseases and the most difficult diseases to be controlled.

3. Poplar ice nucleation bacterial canker caused by Poplar ice nucleation active bacteria such as *Pantoea agglemerans* Gavini al., *P. ananas* Serrano, *Erwinia rhapontici* (Millard) Burkheder, *E. uredovara* (Pan *et al.*) Dye and *Pseudomonas syriagae* pv. *syringae* Van Hall *et al.*

The main reason of harming poplar is that interior of poplar formed ice nucleation to cause freezing injury in early spring and late autumn. The trunk tissue formed and expanded spot necoisis to cause bacterial canker.

Poplar ice nucleation active bacteria canker distributes in different regions of northeast of China, and harms the young seedlings and young trees of poplar species and strains, which is one of the most difficult diseases to be controlled. Recently, researches shown that the early spring was a fine period for controlling the diseases.

4. Poplar coryneum canker caused by *Geryneum populinunu* Bresad (teleomorph for *Myycosphaeralla mandshnrica* M. Miura) distributes in different northeast regions, and harms the young seedlings and young trees of many kinds of poplar species and strains. The diagnosis showed that there are swollen stem canker in the trunk, gray speck in the leaf and black shoot in the young branch.

5. Poplar dothichiza canker caused by *Dothichiza populinunn* Bread., distributes in different northeast regions, and harms the young trees of different poplar species and strains, especially, harms the hybrids of Sect *Tacamahaca* and Sect Aigeiros.

6. Poplar botryodiplodia canker caused by *Botryodiplodia populea* Z.K. Zhong, distributes in Heilongjiang Province and Liaoning Province, and harms the young seedlings and young trees of *Populus robusta*, *Populus pyramidalis* and *Populus xiachei*.

7. Poplar phomopsis canker caused by *Phomopsis macrospora* Kobay & Chiba, distributes in Liaoning Province, and harms the young seedlings and young trees of *Populus simonii* × *Pyramidalis*, *Populus pyramidalis* and *Populus* cv. *shonhaiguan*.

8.Popla branch gall caused by *Dipladia tumefaciens* (Shear) Zalasky, distributes in Xinjiang and Henan Province, and harms the branch and trunk of hybrids *Populus laurifolia*, *Populus tremula*, *Populus tichocarpa*, *Populus nigra* var. *thevestina et al.*

9. Poplar dodder caused by *Cuscuta iaponica* Choisy distributes in different regions all over the country, and harms the young trees and young seedlings.

10. Poplar viscum caused by *Viscum coloratam* (Kom.) Nakai distributes in different regions all over the country, and harms the trunk of poplar.

11. Poplar bark-ruptae and red core is one of the physiology disease distributes in different regions all over the country, and harms many kinds of poplar species.

Root diseases

1. Davids aspen root rot caused by *Fusarium acuminstum* Ellis & Everhart, distributes in different forest regions of Heilongjiang Province, and harms the young trees and young seedlings in the cultivated area.

2. Poplar root decay caused by *Armillariella tabescens* (Scop. ex Fr.) Sing, distributes in different regions of China, and harms the young trees and old trees of many kinds of poplar species.

3. Poplar videt root rot caused by *Heelicobasidium parpureum* (Tul.) Pat. (anomorph for *Rhizoctonia crocorum*) distributes in different regions of all country, and harms the young seedlings and young trees, specially in north China.

4. Poplar root cancer caused by *Agrobacterium tumefaciens* (Smith & Towns) Conn distributes in Hebei Province and Shanxi Province.

Stand rot

1. Davids aspen heart white rot caused by *Phallinum igniarius* (L. ex Fr.) Qué I harms the heart to form sponge white rot.

2. Poplar and willow stand rot caused by *Funalia trogii* (Berk.) Bondarzew & Singer distributes in different regions all over the country, and harms many kinds of poplar species and willow to form stand sap wood white rot.

Control measures

On the basis of idea of forestry sustainable development, the tactics of controlling poplar disease should changed from simple and in short period control measures to sustainable control technology that is the main way based on naturally adjusting talent in ecology systems (Luo 1977).

The control measures of poplar disease should be conducted in whole silviculture works while forest disease spreading rapidly. Those factors, such as the host, pathogen and environments have different effects on poplar epidemical diseases, so we could divide poplar diseases into host dominant diseases and pathogens dominant disease. In China, most of the poplar diseases are host dominant disease (Li 1995). Poplar canker is a typical host dominant disease. *Pathogea* is a kind of facultative parasitic to harm the poplar, only when the host grows weakly. The main control measures are as follows.

Control measures of host dominant disease

The main control measures are to adjust the environments condition, and produce the beneficial condition for the growth of forests. It included the ways as follows: Selecting fine condition to plant the seedling, forcing seedling strong, truncating trunk to save water, cultivation, grass stripping, pruning, intermediate cutting. Otherwise, control measures are also to quarantine pathogens to remove the disease leaf, disease branch and disease trunk, to prevent the disease spreading and to create fine ecological environment condition.

Selecting the fine varieties against diseases

In natural forest condition, the poplar trees coexisted with pathogens to get a balance level during a long time. Because the poplar was artificially cultured in large area in order to form poplar defense forests or pure poplar forest, the environmental condition of ecological balance is damaged. The poplar disease began to spread in the artificial poplar forest. In the past, we only paid attention to the economic characteristics and growing characteristics. Those characteristics such as disease-resistance in selecting fine varieties have been neglected. The gene of disease-resistance of fine varieties lost gradually in poplar. Therefore, resistance of disease should be presented in selecting fine varieties. We should permit the disease to be coexisting with poplar in the low level. According to the points above, the ways of selecting fine varieties are determined, such as selecting disease-resistance varieties, disease-resistance seed origin, disease-resistance single trees, using hybrids and gene breeding techniques etc..

Bio-control

In recent years, we have gotten superiority antagonism species by using bio-control technology on poplar diseases. *Chaetomium* sp. and *Trichoderma* sp. were isolated and determined, its sporopollen and fermented liquid have had great control effects on the canker of poplar and other trees in the experiment land or field. Moreover, *Corilus versicolor* (L. ex Fr) Quel, and *Cerrena unicolor* (Bull. Ex Fr.) Murr were isolated to remove the stumps of poplar. The results showed that the bio-control was a hopeful new ways on the poplar disease in the cultivation field.

Chemical control

On the basis of screening of fungicides in experiment room and field, three systematic germicides were selected, such as Topsin-M, Bavistin and C.C. M. A. It is a necessary urgent measure to use fungicides for controlling poplar disease.

References

Xiang Cunti and Liu Xuefeng. 1997. Integrated control technique of poplar diseases in China [J]. Journal of Forestry Research, **8**(3): 171-173.

Xiang Yuying. 1988. Prevention technique of poplar diseases [M]. Beijing: Forestry Publishing House of China, 246pp.

Jing Yao, Yang Junxu and Weng Peixin. 1988. Poplar Diseases [M]. Xi'an: Xi'an Sciences Technique Publishing House, 1-99.

Yuan Silin. 1977. Tree and shrub diseases of China [M]. Beijing: Publishing House of Scientific Technique, 92-122.

Luo Youqing and Shen Ruixiang. 1998. Sustainable control and silvicultural techniques for harm forest living-thing [J]. Journal of Beijing Forestry University, **20**(1): 96-98.

Li Chuandao. 1995. Control techniques of epidemic forest diseases [M]. Beijing: Chinese Forestry Publishing House, 1-77.